IMPERFECT INFORMATION,

COSTLY LITIGATION AND PRODUCT QUALITY

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Abstract

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In this paper, the effect of costly litigation and imperfect information on the quality of output is examined. An equilibrium is described in which consumers are uncertain about the result of a law suit. It is found that, for a wide range of due care standards, there will be both negligent and non-negligent firms in the market. Furthermore, as the population becomes more risk averse, the proportion of output which is produced by negligent firms increases. If absolute risk aversion decreases as income increases, the reliance on litigation to control product quality and workplace safety will have undesirable distributional effects.

I. Introduction

Consumers and workers are frequently exposed to risks and in many markets, it is difficult or costly for individuals to evaluate these risks. One role of accident law is to compensate risk averse individuals involved in accidents. Another is to provide incentives to firms to consider expected accident costs in their production decisions. When consumers/employees cannot judge the safety of the commodities/workplace, accident costs are not internalized through the market mechanism. Brown [1973] has shown that under several assignments of liability, these costs can be internalized, but his results depend on free access to the legal system.

In this study, I will examine the effect of costly litigation[1] and imperfect information about products in the market and about the outcome of a lawsuit on the quality of the products sold. Throughout the model, it is assumed that a negligence system[2] is in effect and that the legal system works perfectly. This means that when the consumer litigates the defendent will be found to be liable if and only if he was negligent in the production of his output. Negligence is based on the amount of "accident avoidance" purchased by the producer. A due care standard is set by the legal system. If the firm does not exercise this required level of care, he will be found liable in all cases brought against him.

In the model below, a market is described in which consumers cannot judge the quality of the product sold. Equilibrium conditions are derived under the assumption that some consumers are risk averse and there is uncertainty about the outcome of a lawsuit. There will be a

mixed equilibrium in which some firms will be negligent, and others will follow the due care standard. The proportion of the firms which are negligent and the care exercised by these firms will depend on the due care standard and the proportion of the population which is risk averse. In particular, it is shown that as the proportion of the population which is risk averse increases, the proportion of the output which is produced by negligent firms will increase. If absolute risk aversion declines as income increases, then low income consumers will, on average, purchase lower quality output at the same price.

When the population is more risk averse, the consumers will be more conservative in initiating lawsuits. There is, however, an equal-profit constraint. Unit costs for the negligent firms must equal unit costs for the non-negligent firms. There is a unique level of litigation which will maintain this equality. To maintain this level of litigation, the more conservative consumers will require a higher probability of winning the suit. The only way this can be obtained is if there is an increase in the proportion of firms which are negligent.

It is also shown that the mixed equilibrium is stable. If the proportion of firms which are negligent is higher than the equilibrium level, the profits of the negligent firms will be lower than the profits of the non-negligent firms. Similarly, if the number of negligent firms is less than the equilibrium level, negligent firms will make higher profits than the non-negligent ones.

This model can be applied to several legal problems. Section
III contains three extensions. First, with products liability, it
is shown that the model can be applied to a system of strict liability
with defect as well as the negligence system described in Section II.
Medical malpractice and contingent fees are discussed, as well as
Workers' Compensation and occupational diseases.

II. The Model

Assumptions and Definitions

1. The Consumers:

Each consumer is assumed to purchase in a perfectly competitive market one unit of output. If use of the product causes an accident, and if an appropriate level of care was not used in the production of the product, the consumer can collect damages equal to the cost of the accident, C, from the firm if the consumer sues. If an accident occurs, the consumer must decide whether he should invest resources, π, in litigation.[3] It is assumed that π is less than C.

The consumer will collect, costlessly, a test statistic, z, and knowing the relevant conditional density functions, make the decision. The statistic, z, is the consumer's measure of potential negligence. Small values denote high estimates of the probability of negligence.

The court is assumed to have full information. Under the negligence system, the plaintiff will lose the case if and only if the firm is non-negligent. Under strict liability with defect, the plaintiff will lose the case if and only if the output was defective.

The consumers problem is then to select a set of test statistics for which he will sue the producer. Given the probability that the consumer will lose a suit, he will minimize the probability that he will fail to sue a negligent firm. Therefore, the decision-maker will perform a best test in selecting the critical region, the set of test values for which he will not litigate.

The test statistic, z, is assumed to be restricted to the unit interval. g(z) is the conditional density function of the test result, when the firm

involved was not negligent. $h(z)^4$ is the density function of the test

result when the firm involved was negligent, i.e., when the plaintiff

would win the case. Since the statistic z has no natural units, it can be

assumed, without loss of generality, that the test result is defined such

that the ratio, $R(z) = h(z)/g(z)$ is a decreasing function of z. If this

is the case, the best test will be to select a critical test value, z*,

and litigate if and only if the observed value is less than z*.

$G(z)$ is defined to be the cumulative distribution of z, when the firm

is non-negligent and $H(z)$ is the cumulative of z, when the firm is negli-

gent. If a consumer selects a critical test value, z*, $G(z*)$ is the

probability that a non-negligent firm will be sued given an accident has

occurred. Similarly, $H(z*)$ is the probability that a negligent firm

will be sued after an accident.

There are two types of individuals. Some consumers are risk neutral.[5]

They will choose a critical test value, z_1*, to maximize expected income

and they will litigate if the expected gain from litigation exceeds the

cost, π. The other consumers are risk-averse. These individuals all

have the same concave utility function, $U_2(\ )$, and they will select a

critical test value, z_2*, to maximize expected utility. The proportion of

risk-neutral individuals in the ith market is r_i. The initial wealth

of the consumer is Y and the price of the output is p. A consumer who

has sustained an accident will have wealth, $Y - p - C$, if he does not

litigate.

2. The Firms:

Output is produced by a large number of identical firms exhibiting

constant unit costs. The price of the output is equal to the unit production

cost plus expected unit legal costs. All firms, however, need not produce the same quality output. The quality of the output, i.e., the probability that it will not cause an accident, is a function of the level of care, x, used by the firm.

The cost of using care level, x, is \$x per unit of output. The probability of an accident if care level x is used is $f(x)$. It will be assumed that $f'(x)$ is negative, i.e., that the probability of an accident will decrease if more care is taken, and that $f''(x)$ is positive, diminishing marginal returns to accident avoidance measures.

The due care standard, in all markets, is assumed to be x_d. If a firm uses a care level of at least x_d, it is not negligent and will not be liable for any accidents which may occur. If a firm uses a care level less than the due care standard, it will be liable for any accidents which are caused by the use of the product, if the consumer sues. Since all firms are assumed to have identical cost functions, all negligent firms will select the same negligent level of care, x_n, $x_n < x_d$. Since care is costly, all non-negligent firms will choose a care level exactly equal to the due care standard, x_d.

It is shown below, that if the due care standard is not set too high, there will be both negligent and non-negligent firms in the industry. The proportion of firms[6] which decide to be negligent is θ. Consumers are assumed to know θ, $f(x_n)$ and $f(x_d)$.

3. Equilibrium Conditions:

Four conditions must hold in equilibrium. The risk-neutral consumers are selecting a critical test value, z_1^*, to maximize expected income. The risk-averse consumers are selecting a critical test value to maximize expected utility. Given the critical test values selected by each group and the proportion of the population in each group, the negligent firms will select the level of care which minimizes expected costs. Also, since all firms are identical, the expected unit costs of negligent firms must equal the unit costs of non-negligent firms.

I. Risk neutral individuals will maximize expected utility. They select z_1^*, to:

(1) $\max\limits_{z_1^*} \quad \theta f(x_n) H(z_1^*) U_1(Y-p-\pi) + (1-\theta) f(x_d) G(z_1^*) U_1(Y-p-C-\pi) +$

$$[\theta f(x_n)[1-H(z_1^*)] + (1-\theta) f(x_d)[1-G(z_1^*)]] U_1(Y-C-p),$$

where $U_1(\ )$ is the consumers utility function. Differentiating the maximand with respect to z^*, and setting the result equal to zero yields the first equilibrium condition: [7]

(2) $\theta f(x_n) h(z_1^*)[C-\pi] = (1-\theta) f(x_d) g(z_1^*) \pi$

The left hand side of condition (2) is the expected gains from additional valid cases which are pursued when the critical test value is raised. The right hand side is the expected losses due the increase in unsuccessful litigation. This condition can be simplified, and the following equation

is the first equilibrium condition:

$$[\mathrm{I}] \quad \frac{\theta}{1-\theta} \frac{f(x_n)}{f(x_d)} R(z_1{}^*) = \frac{U_1(Y-p-C) - U_1(Y-p-C-\pi)}{U_1(Y-p-\pi) - U_1(Y-p-C)} = \frac{\pi}{C-\pi}$$

II. Similarly, the risk averse individuals maximize their expected utility. The second equilibrium condition is

$$[\mathrm{II}] \quad \frac{\theta}{1-\theta} \frac{f(x_n)}{f(x_d)} R(z_2{}^*) = \frac{U_2(Y-p-C) - U_2(Y-p-C-\pi)}{U_2(Y-p-\pi) - U_2(Y-p-C)}$$

If the second group of individuals is more risk averse than the first, the right hand side of equation [II] is greater than the right hand side of [I].[8] Therefore, since $R'(z)$ is negative, $z_2{}^* < z_1{}^*$. Given the same data, the risk-averse individual will litigate less frequently than the risk-neutral individual.

III. The third equilibrium condition is that the negligent firms are selecting a level of care which will minimize their expected unit costs, given that they will be held liable whenever they are sued, and given the critical test values selected by the potential litigants. The unit costs of the negligent firm are the cost of accident avoidance plus the expected cost of litigation and awards. The optimization of the negligent firm is then:

$$(3) \quad \min_{x_n} \ x_n + f(x_n)[rH(z_1{}^*) + (1-r)H(z_2{}^*)]C.$$

This minimization yields the third equilibrium condition:

$$[\mathrm{III}] \quad 1 + f'(x_n)[rH(z_1{}^*) + (1-r)H(z_2{}^*)]C = 0.$$

IV. As stated above, the fourth condition is that the negligent firms and the non-negligent firms must be earning equal expected profits:

[IV] $x_d = x_n + f(x_n)[rH(z_1^*) + (1-r)H(z_2^*)]C.$

Both firms will sell the output at the price, $p = x_d$. It is also assumed here that no firms will incur litigation costs.

Proposition 1: Uniform and Non-Uniform equilibria.

Definition: Let x_{max} be the minimum expected unit cost for the negligent firm when accident costs are internalized:

(4) $x_{max} = \bar{x}_n + f(\bar{x}_n)C$

where $\bar{x}_n$ is selected to minimize the right hand side of (4), i.e.,

(5) $f'(\bar{x}_n) = -\frac{1}{C}.$

Proposition 1a: Uniform equilibria:

If the due care standard is greater than x_{max}, there will be a corner solution in which all firms will be negligent, i.e., in which $\theta = 1$. In this equilibrium all consumers who sustain accidents will litigate provided litigation costs do not exceed the award. The care exercised by the (negligent) firms will be $\bar{x}_n$, as given by equation (5).

Proof: If the due care standard is greater than x_{max}, profits to the negligent firm will exceed profits to the non-negligent firm for all levels of litigation on the unit interval.

Let $L(x_n, \theta | x_d)$ denote the probability that a negligent firm will be sued, given an accident has occurred. This is a weighted average of the cumulatives, $H(z_i^*)$:

(6) $\qquad L(x_n, \theta | x_d) = rH[z_1^*(x_n, \theta | x_d)] + (1-r)H[z_2^*(x_n, \theta | x_d)]$

Unit costs to the non-negligent firm are x_d, and expected unit costs for the negligent firm are $x_n + L(x_n, \theta | x_d)Cf(x_n)$. If x_d is greater than x_{max}, then:

(7) $\qquad x_d > x_n + Cf(x_n) > x_n + L(x_n, \theta | x_d)Cf(x_n)$

for all $L(x_n, \theta | x_d)$, $0 \leq L \leq 1$.   (See Diagram 1.)

When all consumers litigate (L=1), the right hand side of (6) is minimized at $\bar{x}_n$. Therefore if L=1, all firms will be negligent and will exercise care level, $\bar{x}_n$.

If all firms are negligent, both the risk-neutral and the risk-averse consumers will always litigate, and the result is a uniform equilibrium with all firms negligent.   Q.E.D

Note: The uniform equilibrium with a high due care standard described above will result in the same allocation of resources as a system of strict liability, where firms are responsible for all accidents involving their product.

Proposition 1b: Nonuniform equilibria

If the due care standard is positive, but less than x_{max}, the result is a nonuniform equilibrium. In this equilibrium, some fraction, θ, $0<\theta<1$, of total output will be produced by firms exercising care level, x_n, $x_n < x_d$.

The negligent level of care, x_n, the probability that a negligent firm will be sued, L, and the proportion, θ, of output produced by negligent firms are all increasing functions of the due care standard.
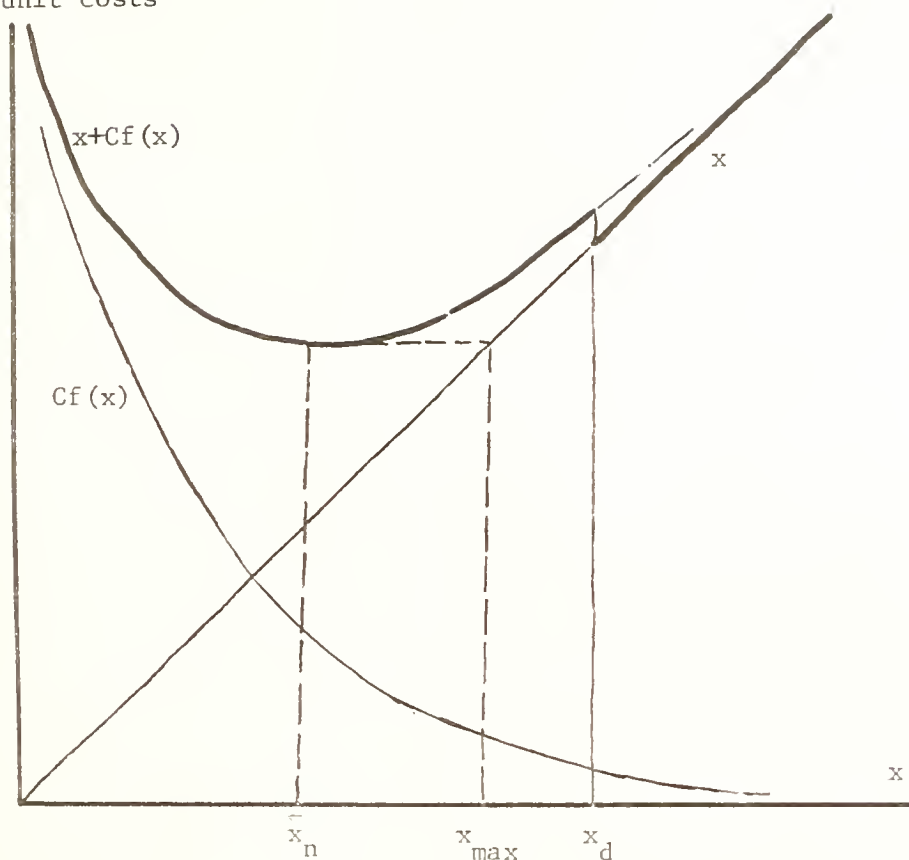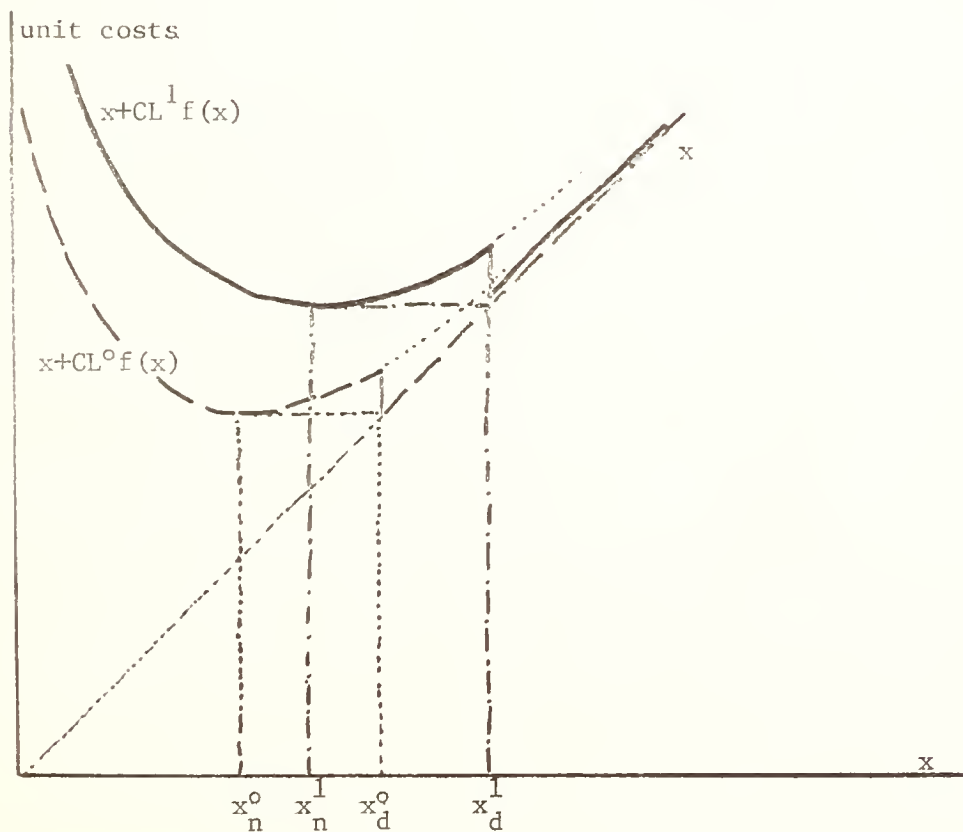
Diagram 1: Uniform Equilibria

Diagram 2: The firms' cost minimization in equilibrium

Proof: $L(x_n, \theta|x_d)$ is given in equation (6) where $z_1^*(x_n, \theta|x_d)$ is given by (I) and $z_2^*(x_n, \theta|x_d)$ is given by (II).

Conditions (III) and (IV) can be rewritten:

(III') $\quad 1 + f'(x_n)L(x_n, \theta|x_d)C = 0$

(IV') $\quad x_d = x_n + f(x_n)L(x_n, \theta|x_d)C.$

From (III') we see that the cost minimizing care level is an increasing function of the probability of litigation, L. The right hand side of (IV') is then also an increasing function of L. Therefore, given that the due care standard is less than x_{max}, there is an equilibrium level of litigation, L, $0 < L < 1$, which determines the equilibrium negligent care level, x_n. The proportion of output produced by negligent firms is determined by conditions (I) and (II). The consumer's first order conditions insure that the positive level of litigation can only be maintained when there is a positive probability of winning a lawsuit, i.e., when θ is positive, and there is a mixed equilibrium.

Since the right hand side of (IV') is an increasing function of L, a higher due care standard can be achieved only if negligent firms face a higher probability of being sued after an accident, so L is an increasing function of x_d. Since x_n is an increasing function of L, it must also be an increasing function of the due care standard.

It remains to be shown that θ is an increasing function of the due care standard.

z_2^* is an increasing function of z_1^*. Dividing condition (II) by condition (I) yields:

$$(8) \quad R(z_2^*) = \frac{U_2(Y-p-C) - U_2(Y-p-C-\pi)}{U_2(Y-p-\pi) - U_2(Y-p-C)} \frac{U_1(Y-p-\pi) - U_1(Y-p-C)}{U_1(Y-p-C) - U_1(Y-p-C-\pi)} R(z_1^*)$$

Since $R(z)$ is monotone, z_1^* is a function of z_2^*, with $\dfrac{dz_1^*(z_2^*)}{dz_2^*}$ positive.

When the due care standard is increased, the probability that a negligent firm will be sued must increase. Since L is an increasing function of z_1^*, $\dfrac{dz_1^*}{dx_d}$ must be positive. Totally differentiating (1) yields:

$$(9) \quad \theta(1-\theta)\frac{f(x_n)}{f(x_d)} R(z_1^*) \frac{d\theta}{dx_d} = -\frac{f(x_n)}{f(x_d)} R'(z_1^*)\frac{dz_1^*}{dx_d} - \frac{f'(x_n)}{f(x_d)} R(z_1^*)\frac{dx_n}{dx_d} + \frac{f(x_n)f'(x_d)}{[f(x_d)]^2 R(z_1^*)}.$$

Each term on the right hand side of (9) is positive, and therefore θ is an increasing function of x_d. The higher critical test values can be sustained only if the probability of winning a case increases, given the test result, z. The proportion, θ must increase to sustain the increased litigation necessary with the higher due care standard. Q.E.D.

Diagram 2 shows the firms' expected unit accident costs, as a function of their level of care. If they choose a low care level, $x < x_d$, then they will be liable for the accident if they are sued. If they choose a higher level, $x \geq x_d$, they are not liable. Their accident-related costs are simply their avoidance costs. In equilibrium, we see that the minimum expected unit cost of the negligent firms is equal to the avoidance costs of the non-negligent firms.

When the due care standard is increased from x_d^0 to x_d^1, we see that the unit avoidance costs of the non-negligent firms increase. The unit costs of the negligent firms must also increase. This can only be achieved by raising the conditional probability of litigation given an accident. Diminishing marginal returns insures that the level of care selected by the negligent firms will rise in the new situation.

Proposition 2: Static Stability: Nonuniform Equilibria

    If consumers and negligent firms continuously adjust their litigation

levels, z_1^* and z_2^*, and their care levels, x_n, to satisfy the first order

conditions, (I), (II), and (III), respectively, and if non-negligent

firms always select the care level, x_d, then when the proportion of negli-

gent firms is less than (greater than) the equilibrium level, the

negligent firms will earn higher (lower) profits than the non-negligent

firms and the proportion of negligent firms will increase (decrease),

moving toward the equilibrium, as firms move from the low profit to the

high profit category.

Proof: The probability that a negligent firm will be sued, given that

an accident has occurred is given in equation (7). As shown above, z_1^*

is an increasing function of z_2^*, and the right hand side of (7) is an

increasing function of both critical test values. Therefore, the prob-

ability that a negligent firm will be sued, given that an accident

has occurred can be expressed as a function of z_1^* alone, with L' positive.

    By differentiating (I), we see that z_1^* is an increasing function of

θ. An individual will litigate more frequently when the proportion of

negligent firms increases. For every level of care by negligent firms,

x_n, $L(x_n, \theta | x_d)$ will be less than the equilibrium probability of

litigation when the proportion of negligent firms is less than the

equilibrium level. Therefore, if the proportion, θ, is less than the

equilibrium proportion, θ^*, the negligent firms' profits as a function

of their care level will lie above the equilibrium profit function. In

particular, the maximum of this higher profit function must be greater

than the equilibrium level of profits. Condition (IV) guarantees that in the equilibrium the profits of the negligent firms must be equal to the profits of the non-negligent firms. With $\theta < \theta^*$, negligent firms will be earning profits higher than the equilibrium, and therefore higher than the profits earned by non-negligent firms.

With the negligence system, negligent firms are earning higher profits than non-negligent firms, therefore non-negligent firms can increase their profits by becoming negligent, and firms entering the industry will enter as negligent firms. The proportion of firms which are negligent will increase, moving toward the equilibrium level. Similarly, it can be shown that if the initial proportion of negligent firms is greater than the equilibrium level, the proportion of negligent firms will decrease, since negligent firms will be earning less than non-negligent firms.   Q.E.D.

Proposition 3:[9] Assume that the industry is selling its output in two markets and that these markets differ only in the proportion of the population which is risk-neutral. Given the assumptions above, a higher proportion of the output sold in the market which has fewer risk-neutral people will be produced by negligent firms, i.e.,

$$\text{if } r_1 > r_2, \quad \text{then} \quad \theta_1 < \theta_2$$

where r_i is the proportion of the ith market that is risk-neutral, θ_i is the proportion of output in the ith market which is produced by negligent firms.

Proof: Given the due care standard, the probability that a negligent firm will be sued is determined by conditions (III') and (IV'). This probability must be the same in either market.

Differentiating equation (7) with respect to z_1^* and r yields:

$$(10) \quad \frac{dz_1^*}{dr} = - \frac{H(z_1^*) - H(z_2^*(z_1^*))}{rh(z_1^*) + (1-r)h(z_2^*)\frac{dz_2^*}{dz_1^*}} < 0.$$

If there is a higher proportion of risk averse individuals, there must be a higher critical test value for each group of individuals, to sustain the required litigation. Totally differentiating conditions (I) and (II) yields:

$$(11) \quad \frac{dz_1^*}{d\theta} = - \frac{R(z_i^*)}{\theta(1-\theta)R'(z_i^*)} > 0.$$

Individuals will raise the critical test value only if there is an increase in the probability that they will win a case, given the test statistic, i.e., there is an increase in the proportion of firms which are negligent.

Therefore, to keep the required level of litigation, a more dangerous mix of products will be sold in the market with the highest proportion of risk averse people. Q.E.D.

III.   Applications and Extensions

A.   Products Liability

In the above model, an equilibrium with a negligence system
and costly litigation is examined. Currently products liability is not
based on negligence, but on strict liability with defect. As set out
in the Second Restatement of Torts, the seller is responsible for
harm to the consumer caused by "any product in defective condition
unreasonably dangerous to the user or consumer" although "the seller
has exercised all possible care in the preparation and sale of his
product".[10]

Although the model dealt with a negligence system, the same
analysis can be applied to strict liability with defect by changing
the interpretation of the variables. Let x denote the quality of
the output, and let $f(x)$ be the probability that a unit of output
of quality level x will cause an accident. The ith firm will produce
a mix of output. A proportion, θ_i, of its output is of quality x_n
or "defective". The remainder of the output is of higher quality, x_d.
With a negligence system, the firm might be considered liable if a
high proportion of the output is "defective", regardless of the quality
of the specific unit involved. Under strict liability with defect,
the firm is liable for all accidents caused by a defective unit of
output, even if they produce only a small quantity of low quality
output. With the variables redefined, the system modeled above
corresponds to strict liability with defect.[11] The interpretation of

Proposition 2, however, changes. θ is the proportion of all output which is defective. If θ is less than the equilibrium level, the expected cost of a defective unit of output is less than the cost of higher quality output. All firms can increase their profits by increasing the proportion of their output which is defective. The proportion of total output which is defective will then increase, approaching the equilibrium level.

As shown in Proposition 3, when similar products are sold in two markets, where the second market has a higher proportion of risk averse individuals than the first, a higher proportion of the output will be defective. Individuals in the second market will sustain a larger number of accidents, but will be partially compensated in only a slightly larger proportion of the cases. If there is decreasing absolute risk aversion, the average income in the second market is lower than the first. Given that the definition of defect is the same in both markets, the consumers will be paying the same price for the output, $p = x_d$, but the low-income consumers will have a higher unit cost when expected accident-related costs are included.

B. Medical Malpractice

The current medical malpractice system is based on a negligence rule. The physician is responsible for an injury caused by the medical treatment if the injury was the result of the physician's negligence. The injured patient must prove that: 1) the injury was iatrogenic, i.e., caused by the treatment, 2) the physician was negligent, and 3) the injury was a result of the negligence.[12] Generally, gathering

this information is costly, and the result is uncertain. The injured patient will face the decision described in Section II, and generally, one would expect that more risk averse patients will be more conservative about risking the resources to gather this information. If low-income patients are generally more risk averse, they will receive, in the equilibrium described above, a lower quality of care.

With contingent fees, the situation changes. While the patient will still bear some of the costs of litigation when the case is lost, the lawyer will also bear some of the cost, and it would be necessary to examine the lawyer's decision-making process. If the density functions used in the model are conditional on the acceptance of the case by the lawyer, the model described above will apply, although, the costs of unsuccessful litigation and the net award in successful litigation will be relatively small.

C. Workers' Compensation and Occupational Diseases

Under the common law, industrial accidents were covered by a negligence-based system. Employers were liable for accident costs only if they failed to exercise appropriate care. In addition, they had three possible defenses: 1) an "assumption of risk" by the employee in his acceptance of employment, 2) "contributory negligence" on the part of the injured employee, or 3) negligence on the part of fellow-workers. These three defenses have become known as the "unholy trinity", and under this system, employees received compensation for less than one quarter of industrial accidents.[13]

By 1921, however, most states had enacted legislation holding employers strictly liable for industrial accidents.[14] When an accident is covered by the workers' compensation system, the employee will receive limited compensation regardless of fault, and is barred from seeking further damages from the employer through the tort system. The covered injury must occur in the course of employment. Although the injured employee might face some uncertainty about the coverage of a personal injury, compensability is especially difficult to determine when occupational diseases are involved.[15] Since there is uncertainty about compensation, and since filing a claim is costly, the relationship between the employer and the employee is similar to the relationship between the firms and the consumers defined in Section II. If it is difficult or costly for the worker to estimate the risks present in the workplace, one might expect to find that risk averse workers will have, on average, less safe working conditions than risk neutral workers. Risk aversion should be relatively high for low income workers and relatively low for a union, as the union will spread the expected litigation costs over all union members, exposed to the risk.

IV. Conclusion

It is shown above that when litigation is costly, the risk aversion of the population is an important factor in determining the effectiveness of a liability rule in controlling an externality. When litigation is costly and the outcome is uncertain, risk averse individuals will require a higher probability of winning than risk neutral individuals. As the risk aversion of the population increases, the litigation will decrease if the quality of output in the market does not change. However, to maintain the equality of unit expected costs for negligent and non-negligent firms, the probability of litigation must be increased to the original level. This can be accomplished only by increasing the probability of winning a suit, i.e., by increasing the proportion of firms which are negligent. Therefore, as the population becomes more risk averse, the average quality of output falls and accident costs rise, although the price of output is unchanged.

If absolute risk aversion decreases as income increases, the existence of costly litigation and the reliance on private enforcement to control quality has undesirable distributional effects, both within markets and across markets.

[1] Several papers have been written examining costly litigation. Ordover [1978] examined the effects of costly litigation on single activity accidents and showed that when litigation is costly, it is no longer possible to use a liability rule to internalize the externality. Furthermore, if an equilibrium exists, at least some agents must be negligent. Green [1978] looks at the effect of litigation costs on medical malpractice. He describes a uniform equilibrium in which physicians are identical and select the same level of care. Randomness enters the model only through the misperceptions of the court.

[2] Another legal system which is frequently considered is a system of strict liability. Here, the firm is liable for any accidents caused by its product, regardless of its expenditures on accident avoidance.

[3] Propositions 1 through 3 also hold when consumers have other options, for example, out-of-court settlements, where at a lower cost, they can seek a lower award.

[4] Propositions 1 through 3 obtain when $h(z)$ is a function also of the level of care used by the negligent firm.

[5] In proving Proposition 3, it is not necessary to assume that some consumers are risk neutral. It is sufficient to assume that type 1 individuals are less risk-averse than type 2 individuals, i.e., $-U_1''/U_1' < -U_2''/U_2'$, where U_i is the ith utility function.

[6] Similarly, one can assume that the ith firm products a proportion of its output, θ_i, using the lower care level, x_n. These units will be

considered to be "defective", and the firm is liable under the strict liability rule. θ is then the proportion of output in the market which is "defective".

[7] It is straightforward to show that the second order condition holds.

[8] This follows directly from Pratt [1964], theorem 1, on p. 128.

[9] Similar results hold when many types of individuals are present in each market. Let $F_i(s)$ denote the proportion of individuals in the ith market whose absolute risk aversion is less than s. Then, $\theta_i < \theta_j$ if $F_i(s) > F_j(s)$ for all $s \geq 0$.

[10] Prosser (1971), p. 657.

[11] Under strict liability with defect, it would be less likely that the consumer can gather additional information about the probability of winning a particular suit, since it is no longer a function of the average care used by the firm he is dealing with.

[12] Steven Dietz, C. Bruce Baird and Lawrence Berul, "The Medical Malpractice Legal System", in U.S. Department of Health, Education and Welfare, Report of the Secretary's Commission on Medical Malpractice. Appendix (Washington, D.C.; 1973), pp. 124-126.

[13] Prosser, Wade and Schwartz, (1976), p. 1179. Some estimates run as low as 6%. See Prosser (1971), p. 530.

[14] Prosser (1971), pp. 530-534.

[15] Chelius (1977), pp. 17-28, also Black Lung Benefits Act of 1972 (1975), p. 5.

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